Product Type: *ASC/2*

Reference: AN2107
Date: 10 February 2009

ASC/2M to ASC/2 Ethernet Connection
Using Ruggedcom Terminal Servers

Purpose

This application note gives the necessary hardware components and a procedure to use Ethernet-type communications to connect an *ASC/2M* Master Controller and four *ASC/2* Local Controllers.

Introduction

There are many factors involved in a successful implementation of an Ethernet-type Communications Network. Most of these factors are beyond the scope of this application note and are not included here. We assume that you are knowledgeable with the various Microsoft Windows® operating systems, administrative functions, and general LAN/WAN terminology and topologies. Figure 1 shows the basic design discussed in this document.

For more information, contact Econolite Technical Support.

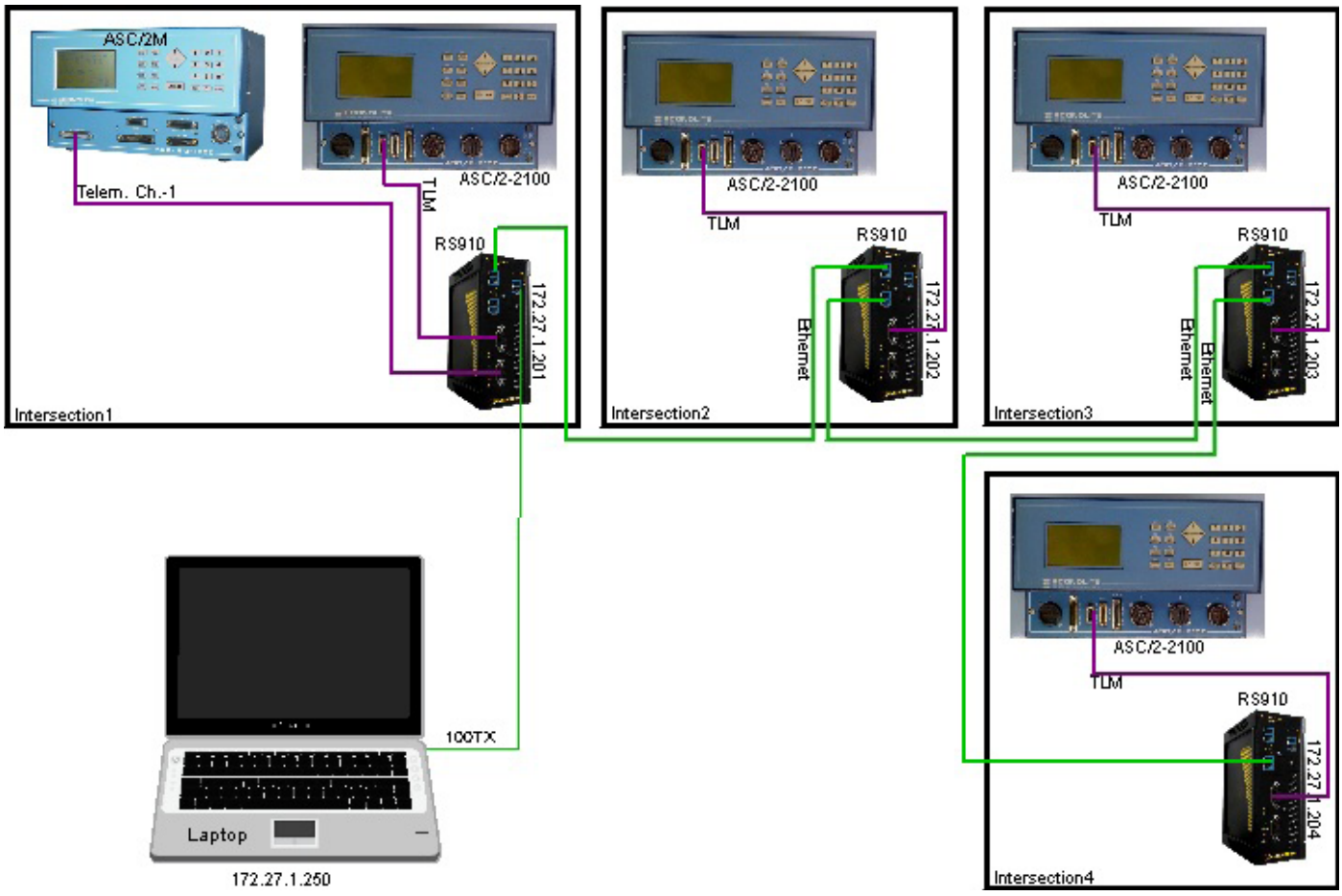

Figure 1. *ASC/2M* to *ASC/2* Ethernet Connection through Ruggedcom Terminal Servers

Hardware

Most of the hardware listed here is shown in Figure 1. However, some of the hardware is internal to the devices shown and thus is not in view.

- **RS 910.** The Ruggedcom RS910 unit meets/exceeds the NEMA temperature range specification. It is temperature-hardened for operation from -40°C to +85°C. The unit supports both 10base-t and 100base-tx Ethernet speeds and auto negotiates the correct duplex operation. DB-9 male-female straight-through serial cables are used for RS232 connections to the *ASC/2* Local Controllers. Econolite Telemetry cable is used for RS232 connections to the Master controller.
- ***ASC/2* RS-232 Telemetry Interface.** These modules are housed in the *ASC/2* and are available as a field-installable upgrade. They meet all environmental specifications of our *ASC/2* controller.
- **Laptop.** Any common Desktop or Laptop running any of the latest versions of the Microsoft Windows OS, an Ethernet port and an RS-232 serial port. (Set the IP address to agree with your LAN. Also, if you are using XP or Vista, make sure that your windows firewall is turned OFF.)

Concept

The major concept that we try to accomplish in this network design is to simulate a physical serial channel on an IP network. To do this, we create a socket connection (virtual serial channel) from each *ASC/2* Local Controller to the *ASC/2* Master. This socket connection consists of a TCP port (virtual port) associated with each serial port (physical port) on the Ruggedcom RS910s.

NOTE: At first, most people find this concept difficult to understand. But, after they have completed the procedure in this application note, they are able to understand this better.

Network Design Considerations

This application note is not intended to describe all of the variables that go into network design.

If you need design assistance in this area, please call your Econolite sales representative, and he/she will make arrangements.

NOTES:

- All devices on an Ethernet network must contain a unique IP address. But the Subnet mask must be identical on each device.
- This application note assumes that you know how to set up a master-local communications serial channel, and so that procedure is not given here.

Configuration of Ruggedcom RS910

1. There is a Ruggedcom manual on the CD that ships with each unit; use instructions in this manual to give each Ruggedcom RS910 a unique IP address set.
2. Use the illustration in Figure 1 of this application note and connect the hardware.

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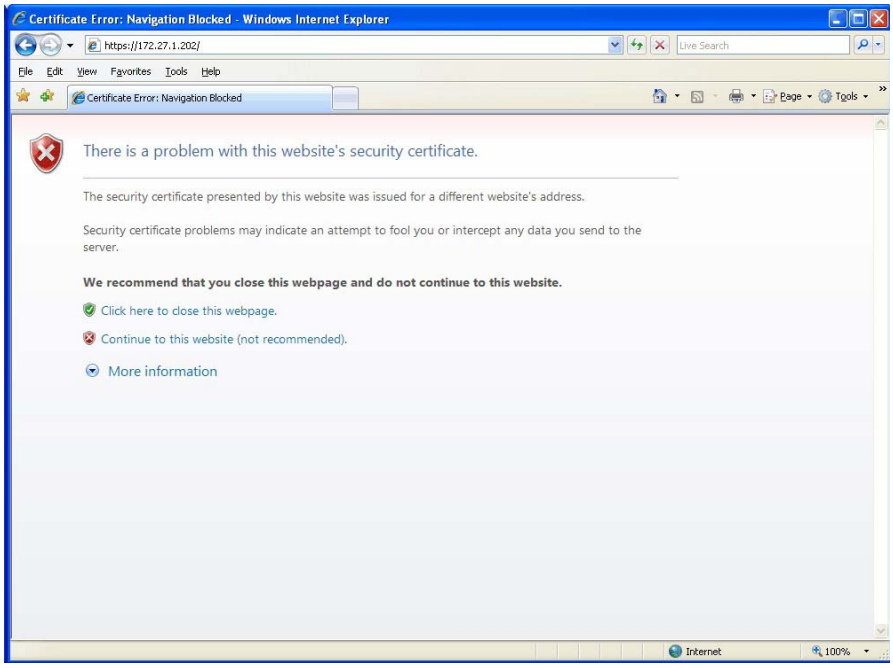
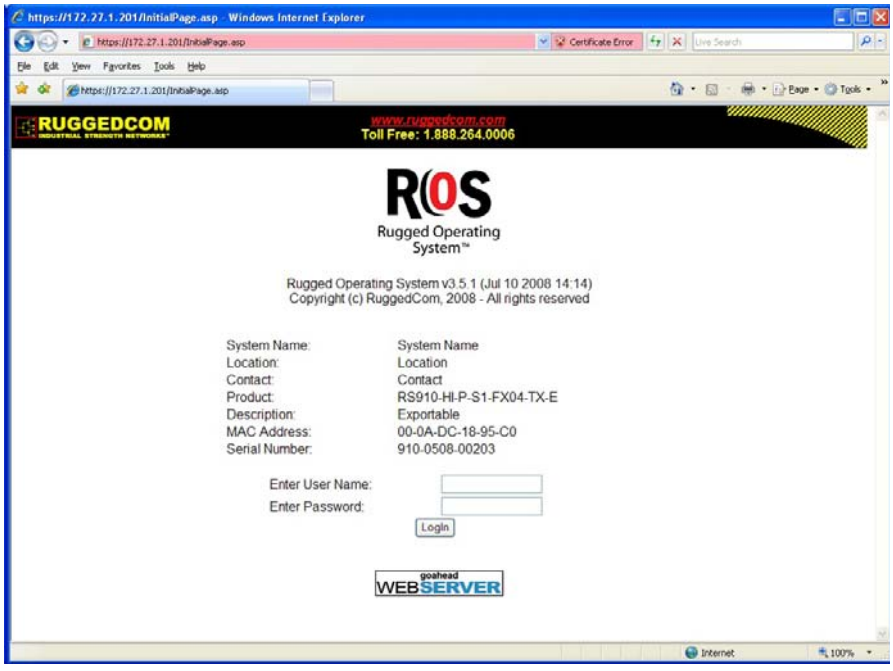
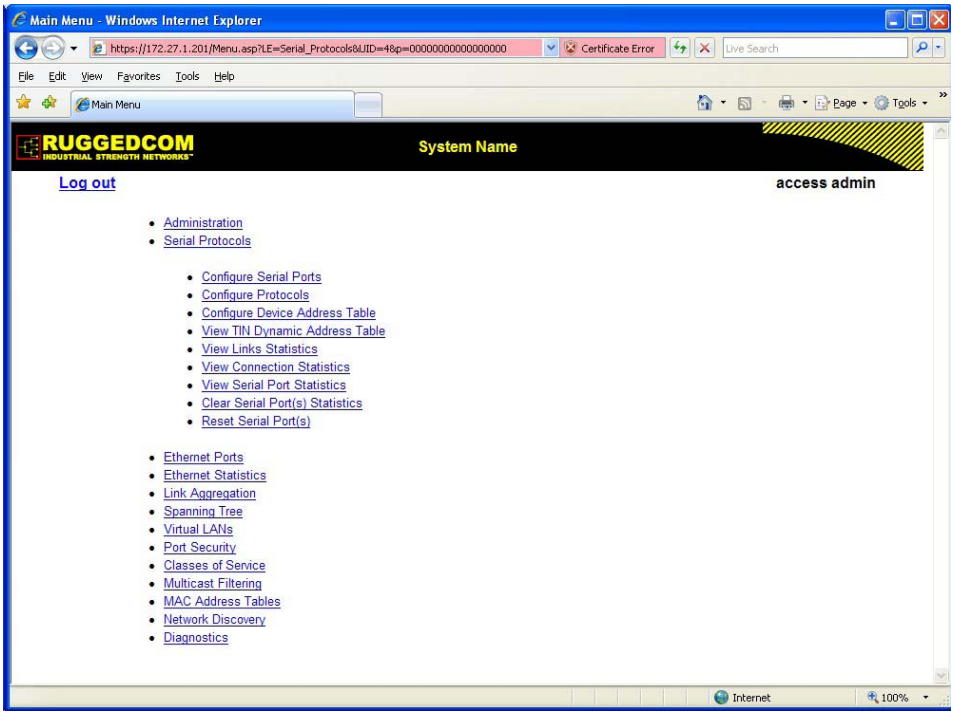
3. Now that each switch has an IP address set, you can start particular configuration. Open Internet Explorer and enter the IP address of the first RS910.
4. If you see a screen like this, click “Continue to this website”.


Certificate Error: Navigation Blocked - Windows Internet Explorer
https://172.27.1.202/
There is a problem with this website's security certificate.
The security certificate presented by this website was issued for a different website's address.
Security certificate problems may indicate an attempt to fool you or intercept any data you send to the server.
We recommend that you close this webpage and do not continue to this website.
Click here to close this webpage.
Continue to this website (not recommended).
More information

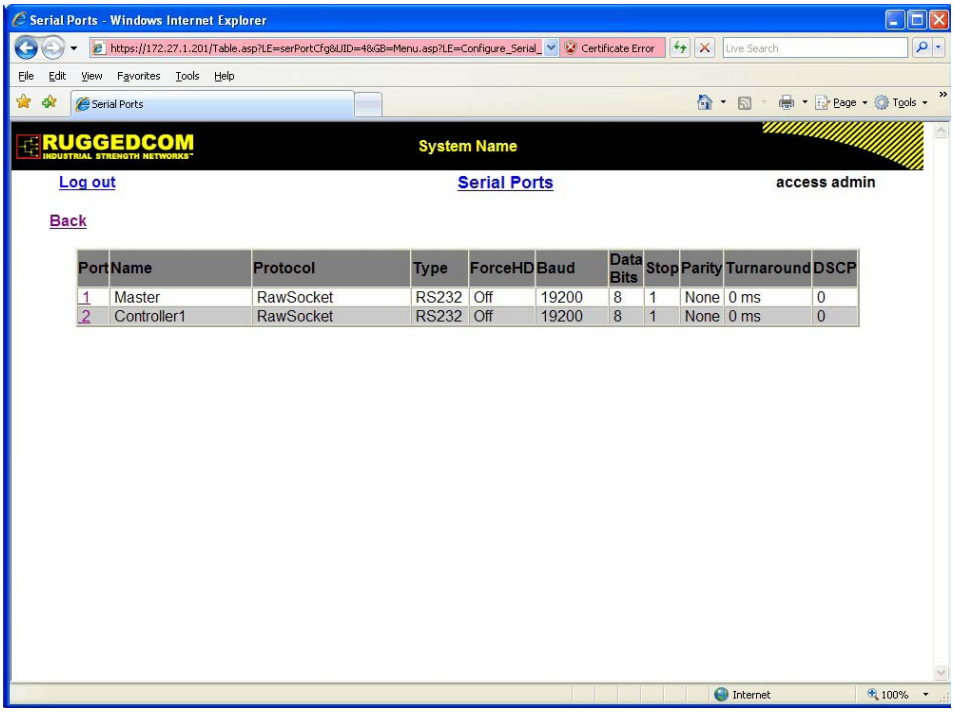
5. A screen similar to this comes into view.
6. Enter the User Name and Password.
   The present factory settings are:
   Username: **admin**
   Password: **admin**
7. Click [Login].



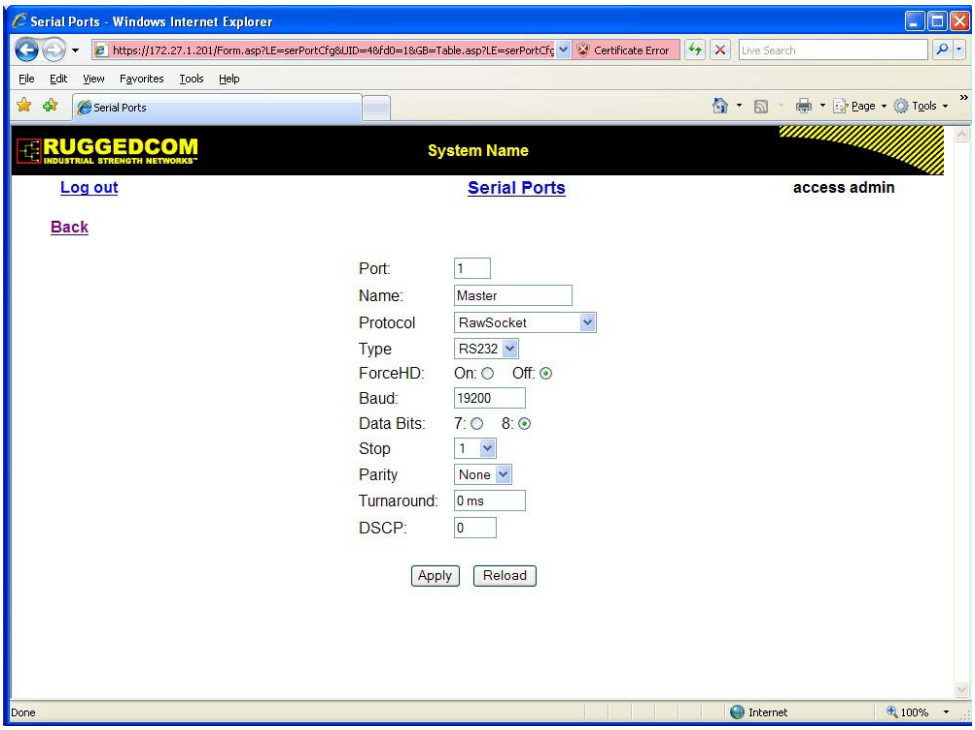
8. Click “Serial Protocols.”
9. Click “Configure Serial Ports.”



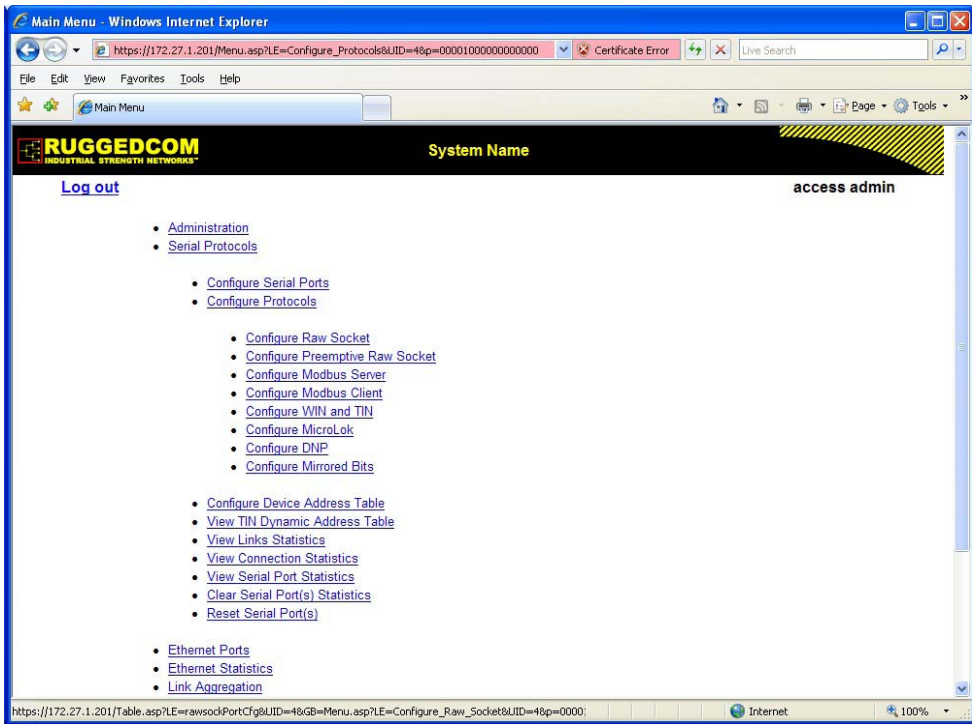
10. Click Port “1.”


Serial Ports - Windows Internet Explorer
RUGGEDCOM
System Name
Log out
Serial Ports
access admin
Back
Port Name Protocol Type ForceHD Baud Data Bits Stop Parity Turnaround DSCP
1 Master RawSocket RS232 Off 19200 8 1 None 0 ms 0
2 Controller1 RawSocket RS232 Off 19200 8 1 None 0 ms 0

11. Enter the Parameters listed here for Port 1.
12. Click [Apply].
13. Click “Back.”
14. Configure Port 2 the same way as Port 1 except, in the “Name” field, enter the name of the Local controller to which it is connected. For our example, it is “Controller1". Remember to click [Apply] and then “Back” to go to the Main menu.

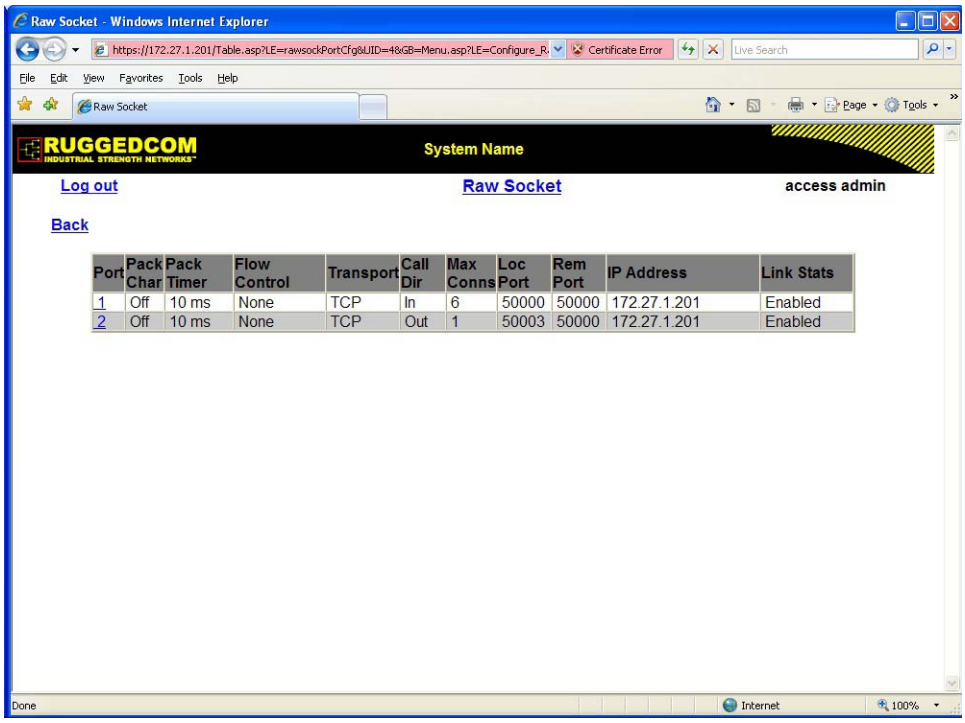


15. Click “Configure Protocols.”
16. Click “Configure Raw Socket”

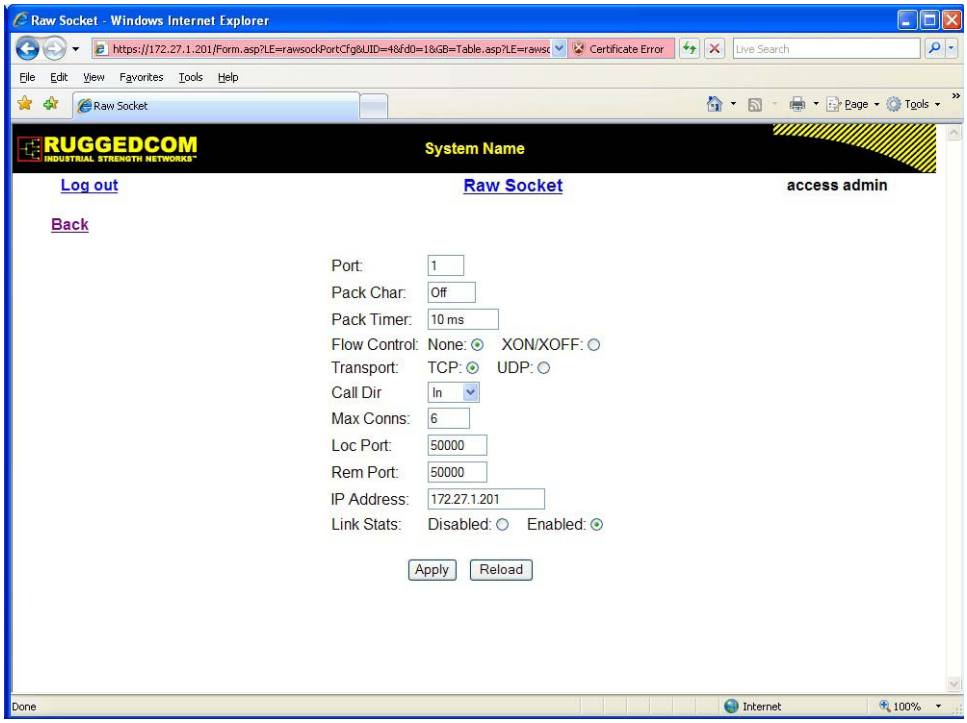


17. Click Port "1," the port that is connected to the Master Controller.

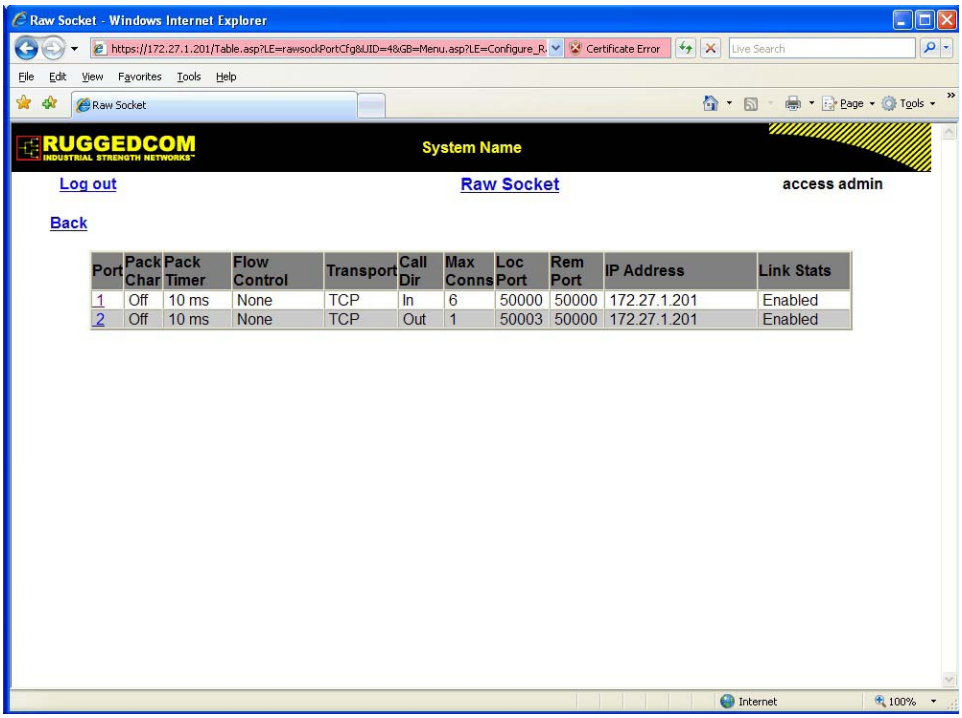
NOTE: Here is where we start the virtual serial channel described in the "Concept" section on Page 2. Port 1 of this switch will be configured to receive incoming connections to the Master Controller. All other ports (connected to *ASC/2* Locals) will be configured to start connections to the Master Controller.


Raw Socket - Windows Internet Explorer
RUGGEDCOM
System Name
Log out
Raw Socket
access admin
Back
Port | Pack Char | Pack Timer | Flow Control | Transport | Call Dir | Max Conns | Loc Port | Rem Port | IP Address | Link Stats
1 | Off | 10 ms | None | TCP | In | 6 | 50000 | 50000 | 172.27.1.201 | Enabled
2 | Off | 10 ms | None | TCP | Out | 1 | 50003 | 50000 | 172.27.1.201 | Enabled

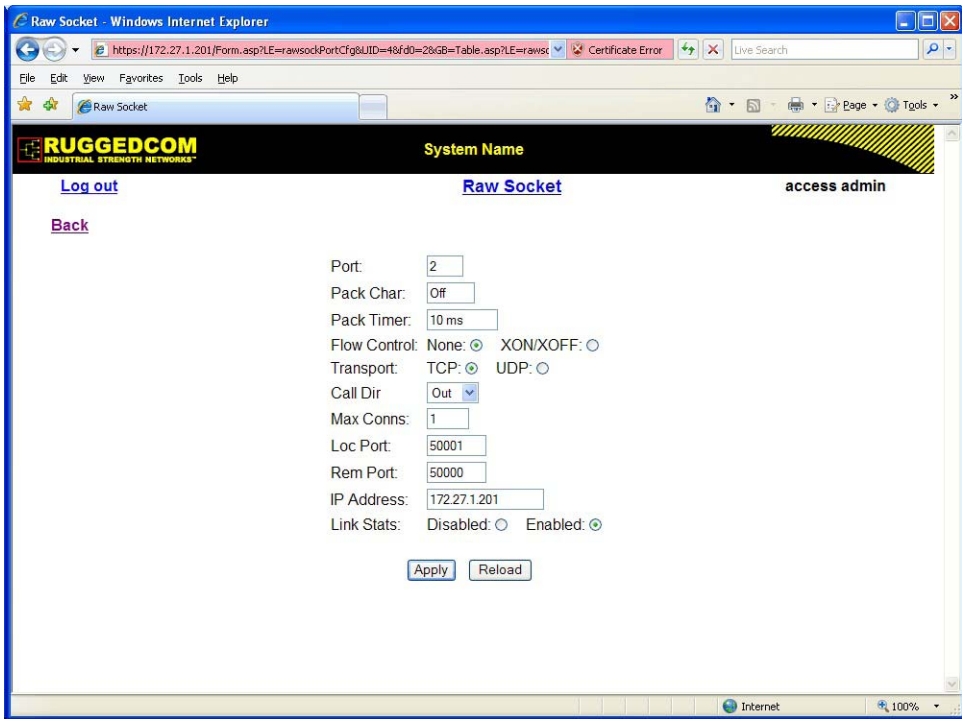
18. Enter the parameters shown here. Note:
    - "Call Dir" set to "In" shows the Master is receiving calls.
    - The virtual port number of the Master is 50000. All Local controllers will talk to this port and will have a unique port number.
    - The "Max Conns" field is set to the maximum number of controllers on this telemetry channel.
19. When all settings are correct, click [Apply], then click "Back."



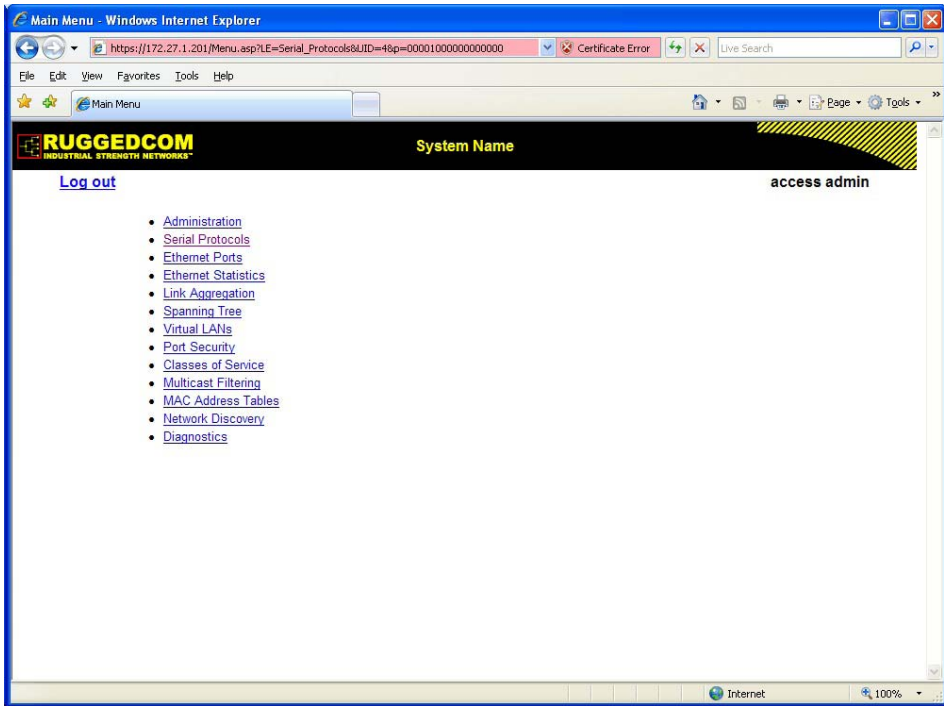
20. Click Port "2" to start the configuration for that port.


Raw Socket - Windows Internet Explorer
RUGGEDCOM
System Name
Log out
Raw Socket
access admin
Back
Port | Pack Char | Pack Timer | Flow Control | Transport | Call Dir | Max Conns | Loc Port | Rem Port | IP Address | Link Stats
1 | Off | 10 ms | None | TCP | In | 6 | 50000 | 50000 | 172.27.1.201 | Enabled
2 | Off | 10 ms | None | TCP | Out | 1 | 50003 | 50000 | 172.27.1.201 | Enabled

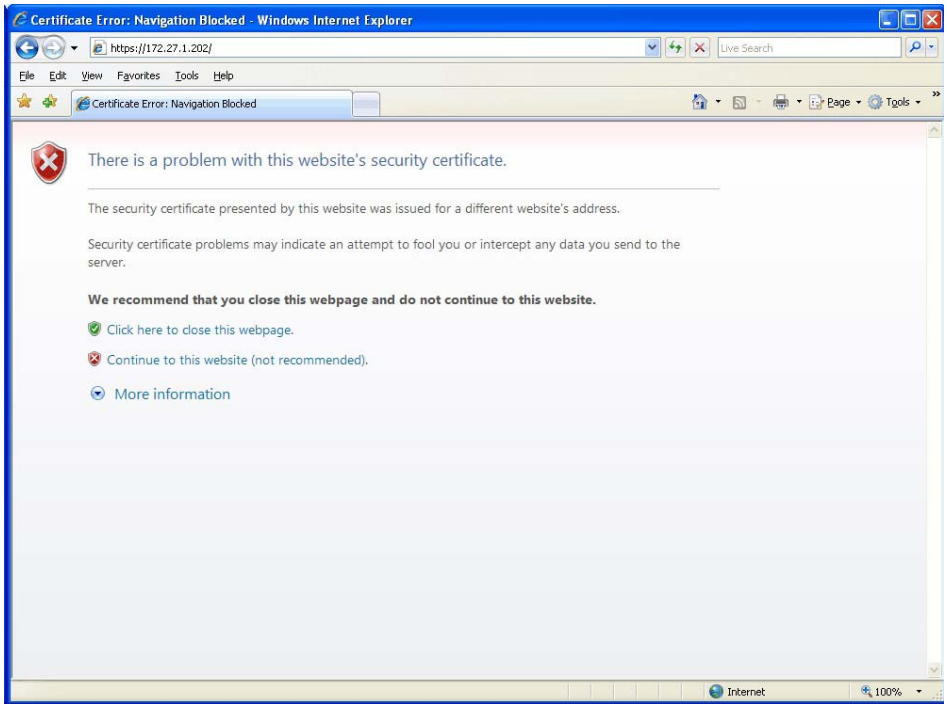
21. Enter the parameters shown here. Note:
    - "Call Dir" set to "Out" makes a socket connection, as mentioned in the "Concept" section on Page 2.
    - "Max Conns" is only "1". This controller will only talk with the Master.
    - The Remote Port is set to that of the Master Controller.
    - The "IP Address" is set to that of that Master Controller.
22. When all settings are correct, click [Apply], then click "Back."



23. Click “Log out” to log out of this RS910 and prepare to configure the next one.

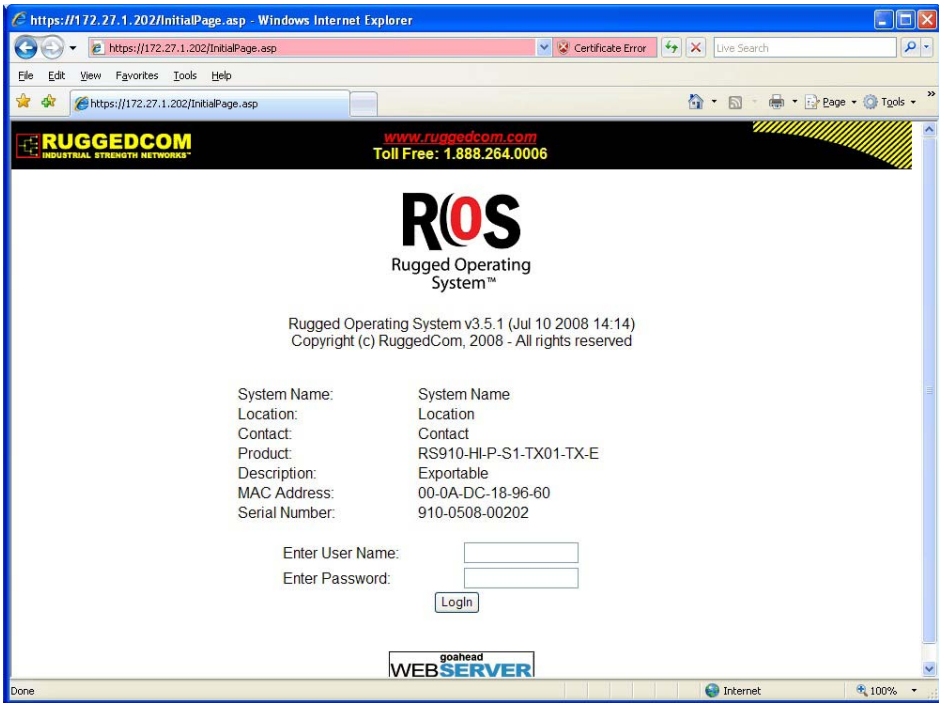


24. To continue with this example, enter this URL in Internet Explorer: https://172.27.1.202

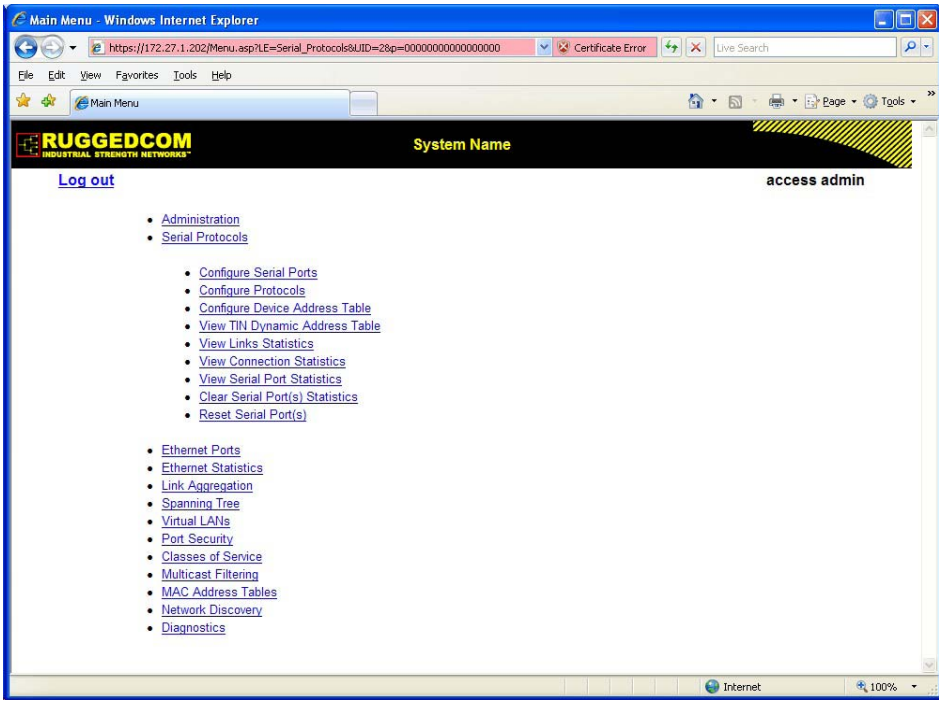

Certificate Error: Navigation Blocked - Windows Internet Explorer
https://172.27.1.202/
File Edit View Favorites Tools Help
Certificate Error: Navigation Blocked
There is a problem with this website's security certificate.
The security certificate presented by this website was issued for a different website's address.
Security certificate problems may indicate an attempt to fool you or intercept any data you send to the server.
We recommend that you close this webpage and do not continue to this website.
Click here to close this webpage.
Continue to this website (not recommended).
More information
Internet
100%

25. Enter the User Name and Password. If you did not change them, they should be:
    Username: **admin**
    Password: **admin**

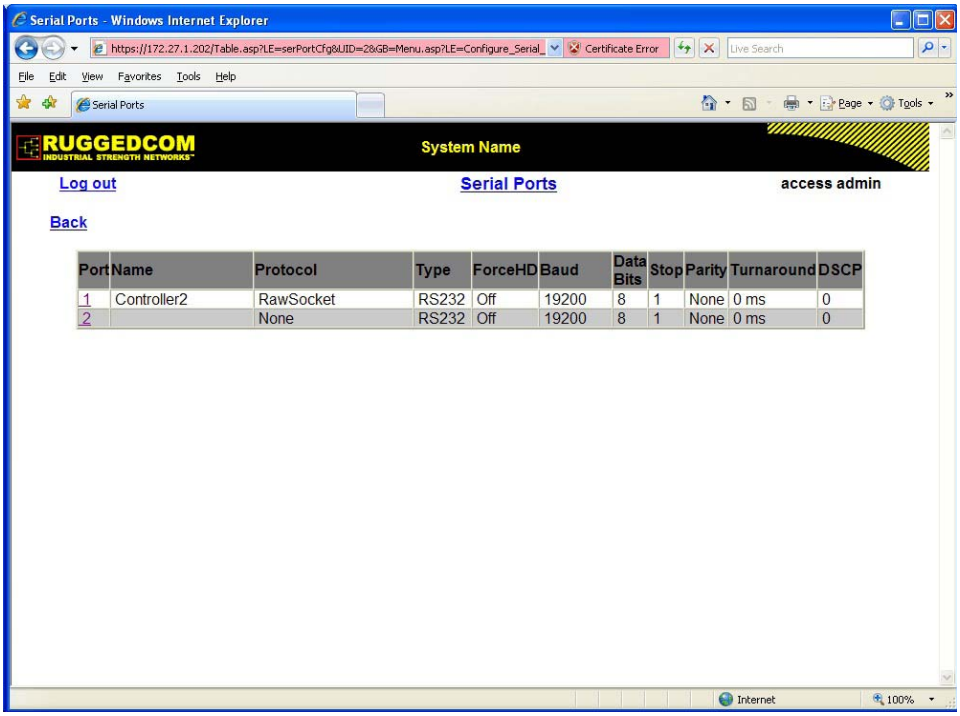
NOTE: Most of the steps that follow are a repeat of the steps above.



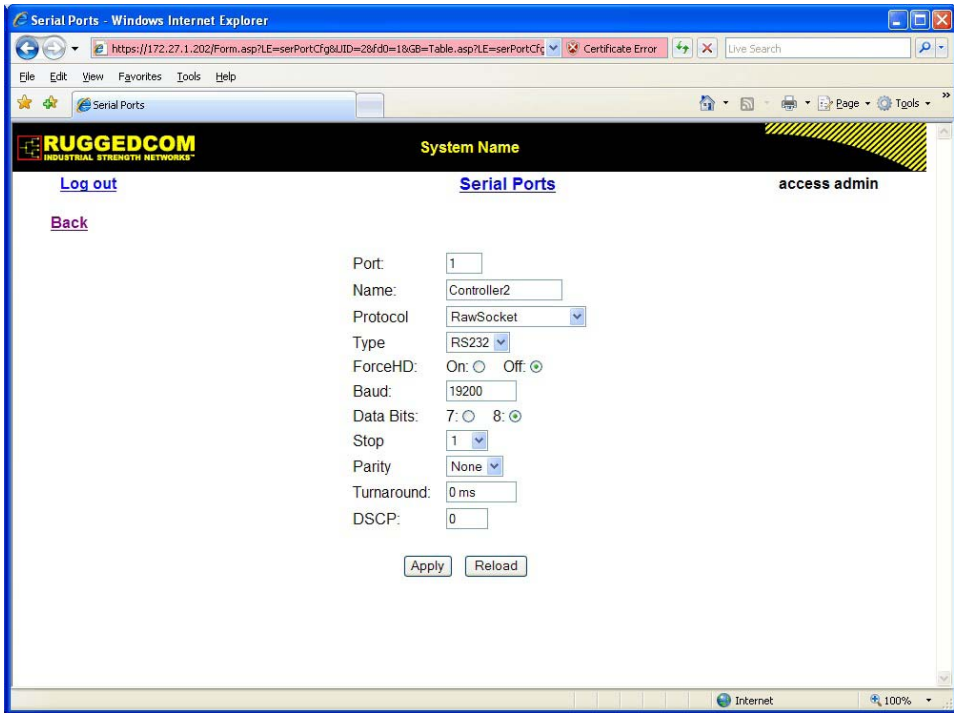
26. Click “Serial Protocols.”
27. Click “Configure Serial Ports.”



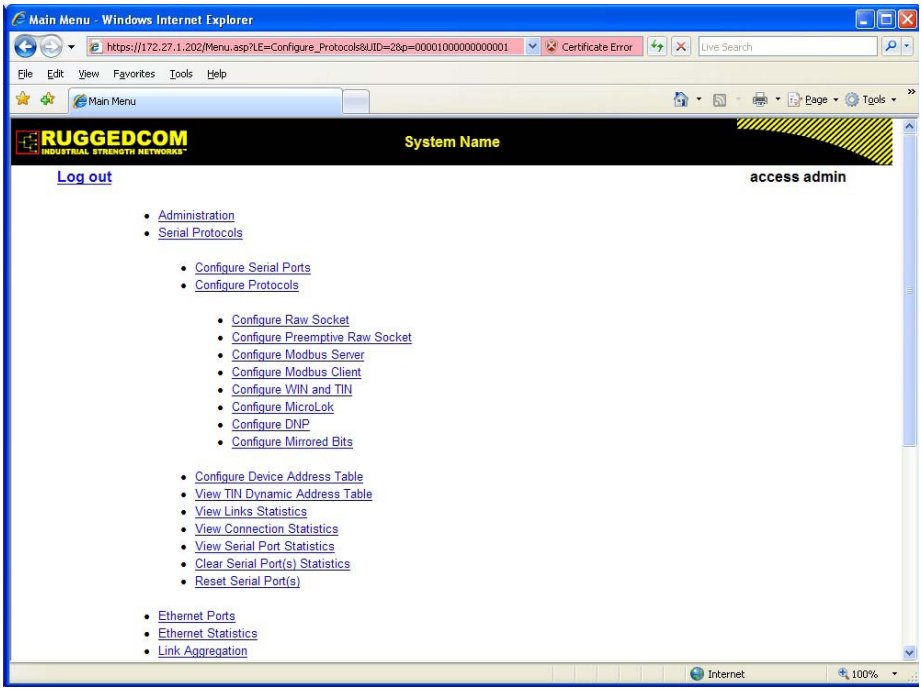
28. Click Port “1”.


Serial Ports - Windows Internet Explorer
RUGGEDCOM
System Name
Log out
Serial Ports
access admin
Back
Port Name Protocol Type ForceHD Baud Data Bits Stop Parity Turnaround DSCP
1 Controller2 RawSocket RS232 Off 19200 8 1 None 0 ms 0
2 None RS232 Off 19200 8 1 None 0 ms 0

29. Enter the Parameters listed here.
30. Click [Apply].
31. Click “Back” the number of times necessary to reach the Main Menu.

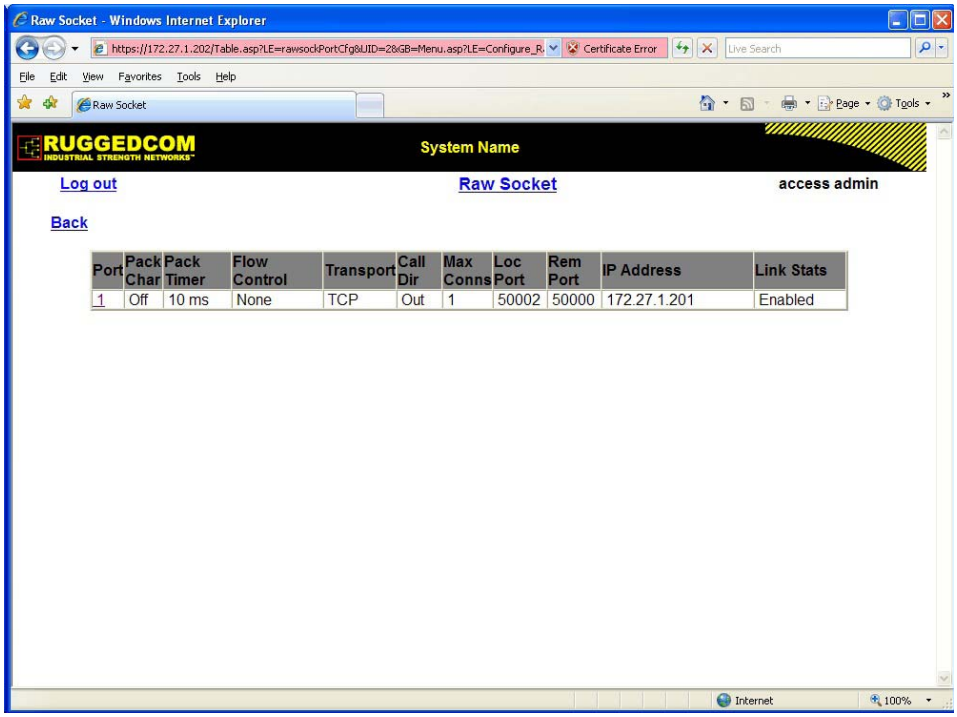


32. Click “Configure Protocols.”
33. Click “Configure Raw Socket”

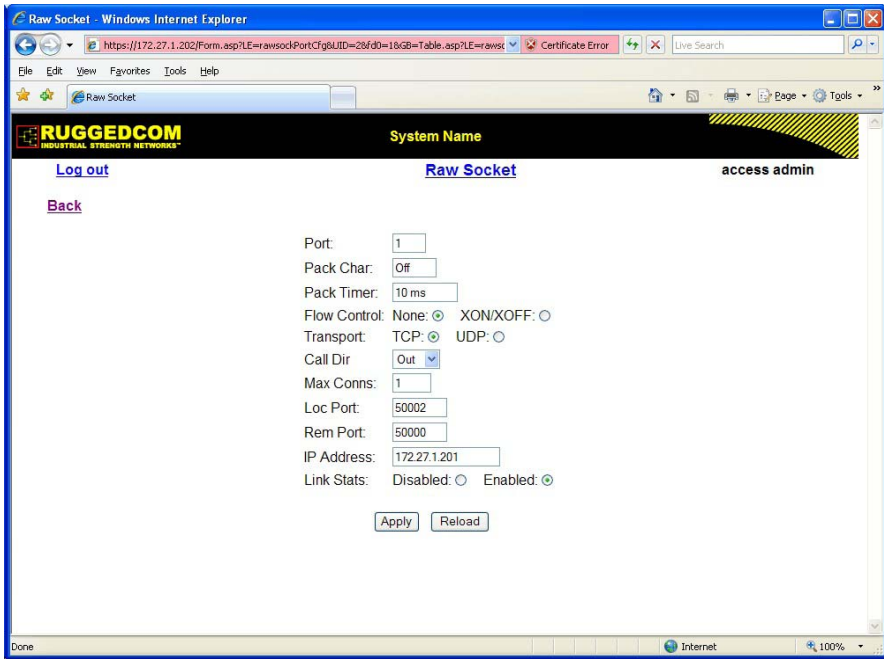


34. Click Port “1”.

NOTE: Port 2 is not listed here. The remaining instructions will only include one port for each controller.



35. Enter the parameters shown here. Note that the "Remote Port" and "IP address" fields point at the *ASC/2* Master controller.
36. Click [Apply].
37. Click "Back" to go to the Main Menu and "Logout."
38. Use the preceding examples and configure the remaining RS910s. Keep in mind that:
    - All Ruggedcom devices must have unique IP addresses
    - All ports that are connected to Local Controllers must be configured to call out to the remote port (50000) of the *ASC/2* Master at IP address 172.27.1.201.



How to Make the Ruggedcom Configuration Easier to Manage

It is useful to keep certain parameters similar. Make the last digit of the IP Address and Port Numbers the same as the controller number. For example, for Controller 2, the IP Address ends in "2" (172.27.1.202) as does its Port Number (50002). This should help to organize records and makes it easier to troubleshoot. Before you configure the system, it is helpful to catalog this information in a table (see example below).

Intersection#	Controller#	Physical Port#	IP address	Local Port #	Remote Port #	Remote IP
1	Master	1	172.27.1.201	50000	50000	172.27.1.201
1	1	2	172.27.1.201	50001	50000	172.27.1.201
2	2	1	172.27.1.202	50002	50000	172.27.1.201
3	3	1	172.27.1.203	50003	50000	172.27.1.201
4	4	1	172.27.1.204	50004	50000	172.27.1.201

Configuration of the Master

1. To configure the *ASC/2M* telemetry settings, go to MM-1-0-9.
2. Enter the settings shown.

TELEMETRY SETUP AND OPTIONS

TELEMETRY SETUP

	CH1	CH2
DATA RATE (bps).....	19.2K	****
DATA FRAMING (parity, stop)	8,N,1	****
COMMANDS / SECOND	25	****
COMMAND TIME	724	****
WINDOW	80	****
BUFFER LEVEL	3	****
RTS TO CTS DELAY	0	****
TRANSMIT TIME	0	****

3. To enable devices in the *ASC/2M*, go to MM-1-0-2.

   You will probably have more settings here because of more locals than this example.

ENABLE DEVICES

DEVICE#	SYSTEM DET.	CONT.	SPEED TRAP	TELEM. CHAN.
1.....	.	x	.	x
2.....	.	x	.	.
3.....	.	x	.	
4.....	.	x	.	
5.....	x	.	.	
6.....	x	.	.	
7.....	x	.	.	
8.....	x	.	.	

4. To set up the Telemetry Sequence for Channel 1 in the *ASC/2M*, go to MM-1-0-3.

   Again, your settings will probably be different for your application.

TELEMETRY SEQUENCE CHANNEL 1
(See HELP for caution.)

LOCAL TELEM ADDRESS	CTR 1-24	AUX 1-24	SDA1 1-32	SDA2 1-32	SDB1 1-32	SDB2 1-32
1...	1	1	1	0	0	0
2...	2	2	2	0	0	0
3...	3	3	3	0	0	0
4...	4	4	4	0	0	0
5...	0	0	0	0	0	0
6...	0	0	0	0	0	0

Configuration of the *ASC/2* Locals

To configure the telemetry port in the *ASC/2*, go to MM-1-6.

The TELEMETRY ADDRESS is the controller number.

NOTE: The telemetry response delay metric is 922= 1 millisecond. Thus 19,362 is 21 milliseconds (922 x 21 = 19,362).

For other values, refer to the "*ASC/2* Telemetry Response Delay Table" at the end of this application note.

PORT3 CONFIGURATION

PORT3 PROTOCOL	TELEM
PORT3 ENABLE	YES
PORT3 MILISEC TIMING	NO
PORT3 RTS TO CTS DELAY	0
PORT3 RTS TURN-OFF DELAY	0
DUPLEX — HALF or FULL	FULL
MODEM DATA RATE (bps)	19.2K
DATA, PARITY, STOP	8, N, 1
TELEMETRY ADDRESS	(?)
SYSTEM DETECTOR 9 – 16 ADDRESS	0
TELEMETRY RESPONSE DELAY	19362
ADDITIONAL SCREEN(S)	

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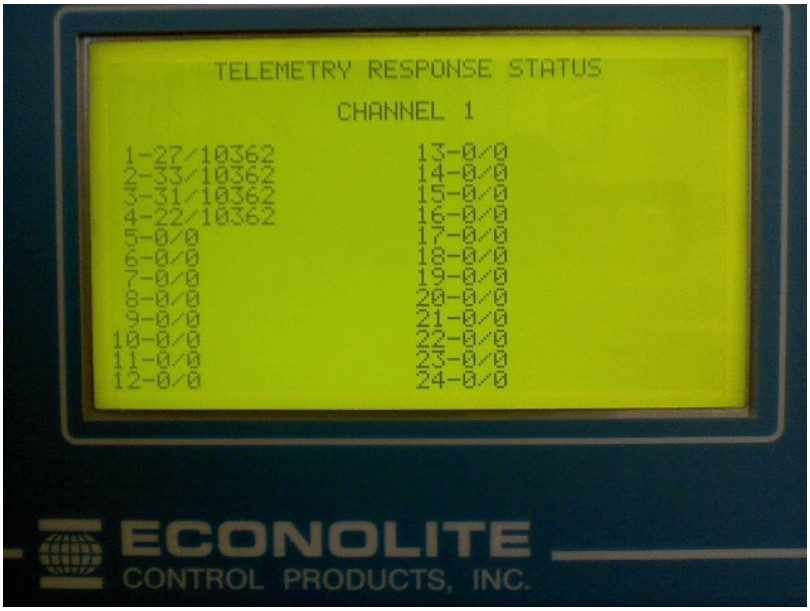
Make sure of Master-to-Local Communications

1. To go to the "TELEMETRY RESPONSE STATUS" screen, in the master, go to MM-3-6.

2. If all has gone well, the screen should be similar to the screen shown here.



Notice (make sure) that packet loss is <1%.

Depending on your communications architecture, you may want to adjust the telemetry response delay (either up or down) in the locals to get the packet loss as low as possible.

Other Design Considerations

Ruggedcom builds a number of serial device servers that can be used to accomplish this task and may be better than the products used in this example. Refer to their website:

http://www.ruggedcom.com/products/ruggedservers/

For more assistance with design considerations and product selection, please contact your Econolite sales Representative.

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ASC/2 Telemetry Response Delay Table

Delay metric	Amount of time in msec
0	0
922	1
1844	2
2766	3
3688	4
4610	5
5532	6
6454	7
7376	8
8298	9
9220	10
10142	11
11064	12
11986	13
12908	14
13830	15
14752	16
15674	17
16596	18
17518	19
18440	20
19362	21
20284	22
21206	23
22128	24
23050	25